NAVAL SEA SYSTEMS COMMAND

Water Barrier

SHIP SELF-DEFENSE

NAVSEA DAHLGREN

AFTER IMPACT

DESTROYED STRUCTURE
BROKEN CONTROL SURFACES
DEFEATED AERODYNAMICS

DEMOLISHED STRUCTURE
FAILED JOINTS
DAMAGED INTERNAL PARTS

CRUSHED WARHEAD
DEFEATED FUZE
EXPOSED EXPLOSIVE

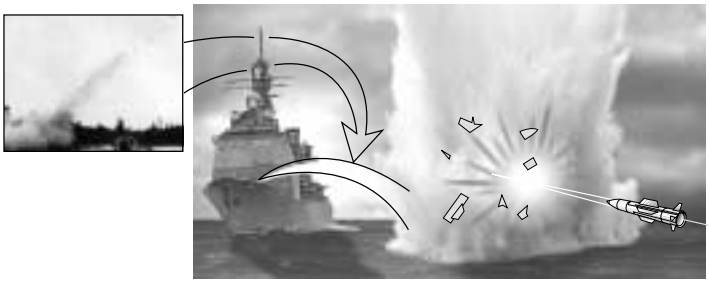
SURFACE WARFARE
CENTER DIVISION

DAHLGREN PANAMA CITY DAM NECK

Challenge

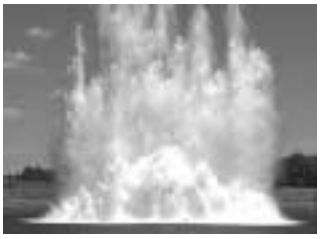
Today's Navy operates in and near littoral waters in potentially hostile situations. Surface ships must be capable of defending against a wide variety of antiship cruise missiles (ASCMs) launched from land, surface ships, aircraft, and submarines. These sea-skimming missiles represent the most severe challenge for ship self-defense today. Using high-speed, low-altitude, run-in trajectories to delay shipboard detection as long as possible, ASCMs decrease the space and time available to defend against them. Detection of these ASCMs is further reduced by the use of signature reduction and the combined effects of multipath and clutter. Adding a critical last-second layer of self-defense, the Water Barrier Ship Self-Defense System combats the threat of ASCMs in a hostile environment.

Concept of Water Barrier Ship Self-Defense



WATER BARRIER SHIP SELF-DEFENSE

In concept, the ship's self-defense system provides normal detection and engagement of an attacking sea skimmer (ASCM). However, if the sea skimmer is not destroyed and reaches the critical range of 300 feet from the ship, the Water Barrier Ship Self-Defense System uses a rocket-launched line charge to form a wall of water as a critical last-second protection.



WATER BARRIER

MHLS

MK 155 MCS

This wall of water prevents severe damage resulting from short-range intercepts and the target debris they create. Because the wall is effective for multiple seconds, it also will defeat the fuzing and structure of any additional ASCMs that have penetrated the outer self-defense layers. The Water Barrier Ship Self-Defense System is capable of handling simultaneous threats.

Accomplishments to Date

Under the sponsorship of the Office of Naval Research (ONR), NSWCDD has developed an innovative technology that uses a new kill mechanism, a wall of water, to provide a low-cost effective, terminal defense system for Navy ships. Accomplishments to date are the following:

New Key Technologies

- Kill mechanism for terminal defense
- Hydrodynamic Barrier Plume Model for testing
- Plume density measurement techniques
- Creation of large volume of water
- Documentation in 40 technical reports and papers

Demonstrated Water Barrier Effectiveness

- Defeat of fragments and projectiles
- Defeat of tactical battlefield TOW
- Duration effectiveness of seconds
- Effective in simulated sea states

Conducted Analysis of Deployment Concepts

- To build on Shallow Water Mine Clearance Technology
- To build on Modular Horizontal Launching Technology
- Low cost versus AAW missiles
- Small footprint for shipboard deck placement

Investigated System Issues

- Additional layer of self-defense
- Potential to handle simultaneous threats
- Increased decision time for ship defense
- Noninterference with RAM engagements
- Nondegradation of CIWs cumulative Pk
- Improved self-defense against stealthy threats

Future Payoffs

Using the demonstrated effectiveness of the water barrier, the Water Barrier Defense can build on Shallow Water Mine Clearance Technology that deploys line charges and the Modular Horizontal Launching System that ejects payloads using automotive airbag technology. Once fully operational, the Water Barrier Ship Self-Defense System will:

- Provide low-cost, effective, terminal defense.
- Intercept high-speed sea skimmers at short range.
- Minimize damage from short-range intercepts.
- Enhance success of ship survival from raid.
- Increase ship commander's decision time.
- Maintain battlespace dominance of sea skimmers.
- Minimize fratricide or damage to third parties.

Support of Other Mission Areas

In addition to terminal defense, the Water Barrier Defense has the potential to provide a very capable and robust supporting role in other mission areas, such as:

- Robust convoy defense using cooperative engagement
- Very capable defense of ships from land attack in NSFS missions and Joint amphibious operations in the littoral battlefield
- Flexible mission potential to counter torpedoes and mines
- Nonlethal defense against small boats and light aircraft to counter terrorist and drug operations

NAVSEA
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Surface Warfare Center Division

NSWCDD/MP-98/99;10/99

For additional information, please contact:

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